Prospects to improve the productivity of sheep fattening in Ethiopia: Status, challenges and opportunities

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Executive summary

Sheep fattening that targets sales during festive seasons has been a common and long-standing practice by Ethiopian farmers. However, it has not received much research, extension and policy attention.

Identifying and documenting prevailing sheep fattening practices, type of sheep fatteners involved, prospects for improving the productivity of sheep fattening and the challenges and opportunities associated with sheep fattening is a vital step towards designing appropriate intervention schemes to exploit the potential of the sector.

This report provides an overview of the sheep fattening scenarios in Ethiopia. It presents an overview of the characteristics of the prevailing sheep fattening activities. It describes the challenges and opportunities likely to slow or enhance productivity in sheep fattening activities in Ethiopia and the prospects of improving sustained productivity.

It is based on a survey that consulted sheep fatteners, researchers from various national and regional research institutes and livestock experts from different offices of the Bureau of Agriculture in different parts of the country. The scope of the survey did not encompass detailed data collection.

Sheep fattening across the surveyed areas was recognized as a profitable venture. However, the average number of annual fattening cycles is limited to 2, mainly targeting religious holidays.

Sheep fattening of rams can commence as early as 3 months of age but most respondents across the country fatten yearling rams. The length of sheep fattening is commonly 3-12 months.

Sheep fattening is constrained by feed scarcity, market access, poor husbandry practices, disease prevalence and labour shortage.

The sheep fatteners encountered in the survey have diverse production objectives and vary enormously in the type and use of production inputs such as feed, labour, and housing. Fatteners also vary in feeding systems, source of sheep for fattening, breed choice, number of annual fattening cycles, and number of sheep fattened per cycle.

There is minimal progression towards commercial based sheep fattening associated with clear production objectives and financial capacity and little tendency towards more control on the overall management as well as control on the choice of sheep types and breeds to be used for fattening.

Based on the data acquired during this survey and the observable variations among fatteners, sheep fattening activities in Ethiopia can be broadly grouped as i) smallholder rural farmers sheep fattening systems, ii) peri-urban and urban small scale sheep fattening systems, iii) cooperative sheep fattening systems and iv) large scale sheep fattening systems. These four broadly categorized sheep fattening systems need further characterization with detailed and well planned research.

Introduction

Fattening has been defined as intensive feeding of highly nutritious feed to promote fast growth and fat deposition to achieve desired carcass growth and quality (Alemu, 2007). Such systems can be applied to sheep as they` can easily adapt to an intensive system of production under feedlots (Pasha, 2006). Fattening programs aim to realize maximum growth rate and higher carcass yields in a minimum period of time, which would raise production per unit of land and the value of the livestock. This could be an economically viable strategy compared to systems where animals are kept for long periods of time on sub-optimal levels of feeding with consequent cyclic changes in weight gain.

Sheep fattening in Ethiopia has been recognized as a potential profitable activity that enhances the income of smallholder farmers (Shapiro et al., 1993; Pasha, 2006). Success stories from the project "Improving Productivity and Market Success of Ethiopian Farmers (IPMS, 2013)" highlighted that sheep fattening has transformed the lives of smallholder farmers in parts of the Oromia region by enhancing household incomes which has led to diversification of agricultural activities. However, such benefits have not been realized on a wider scale due to insufficient interventions as a result of the limited attention that sheep fattening has been received to date.

Traditionally, farmers in Ethiopia are used to fatten a few sheep based on available inputs targeting sales during festive holidays. This is based on limited scientific and technical knowhow in feeding systems and husbandry practices. Shapiro et al. (1993) suggested that there appears to be a lack of appropriate feed packages to make sheep fattening an economically viable system.

However, comprehensive information and literature on sheep fattening in Ethiopia is lacking. There have been several growth trials on different breed types of yearling sheep using various feed resources by the National Research Centers as well as by graduate students at various higher institutes of learning in the country. Such studies have evaluated the performance of sheep under different feeding strategies, such as different types and levels of supplementation, different proportion of supplementary ingredients and different basal feeds. However, such studies appear to be more of characterization of the feed resources because the effects of critical parameters related to sheep fattening such as age and weight at the onset of fattening, length of fattening, target weights, associated feeding and management practices are not considered.

There is need for the identification and documentation of the existing fattening practices for different breeds of sheep by various fatteners in Ethiopia. This would contribute towards designing appropriate intervention measures to exploit the potential of this sector and draw benefits from it.

This report presents the characteristics of the prevailing sheep fattening activities in Ethiopia as described by stakeholders across various regions, the challenges likely to slow productivity and the prospects for improving sustained productivity.

It is based on survey work that consulted sheep fatteners, researchers and livestock experts from several offices of the Bureaus of Agriculture in various parts of the country. The report identifies the various types of sheep fatteners prevailing in the country, with their main differentiating features and classifies them into different sheep fattening systems based on the information captured in the survey. The paper concludes by forwarding possible research, development and policy intervention areas for improving the productivity and sustainability of sheep fattening in the Ethiopia.

Study approach and methodology

The survey was undertaken in two districts around Bahir Dar (Northwestern highlands), Beke and Debre Berhan (Central highlands), Bako and Horro Guduru (Western highlands), Agaro and Bonga (Southwestern highlands), Woliata sodo (Southern highlands), Melka Werer (Afar lowlands) and Jigjiga (Eastern lowlands) as shown in Figure 1 and Table 1.

These areas represent the different agro-ecologies (Table 2) which are home to the main sheep breeds of Ethiopia namely Washera, Farta, Menz, Horro, Bonga, Woliata (Adilo), Afar and Blackhead Somali. These are also the main breeds used for fattening.

Stakeholders in sheep fattening consulted in the survey include smallholder rural farmers, peri-urban and urban fatteners, cooperative and larger scale sheep fatteners, youth cooperatives, live sheep exporters, export abattoirs, regional and national research centres working with livestock, district, zonal and regional bureaus of agriculture and offices of the regional or zonal Livestock Resource Development Promotion Agency (Table 1).

Information was collected on different aspects of sheep production and fattening including annual sheep fattening cycles, feed resources and feeding systems employed, husbandry practices for sheep fattening, common sheep diseases, the type of sheep breeds used for fattening and reasons for breed choices, fattening issues and trends in the last five years, constraints for sheep fattening, market opportunities, vulnerability in sheep fattening, and profitability of sheep fattening activities.

Information obtained from the research and agricultural offices attempted to capture the general picture of existing sheep fattening activities, while specific sheep production or fattening issues were captured from the sheep fatteners.

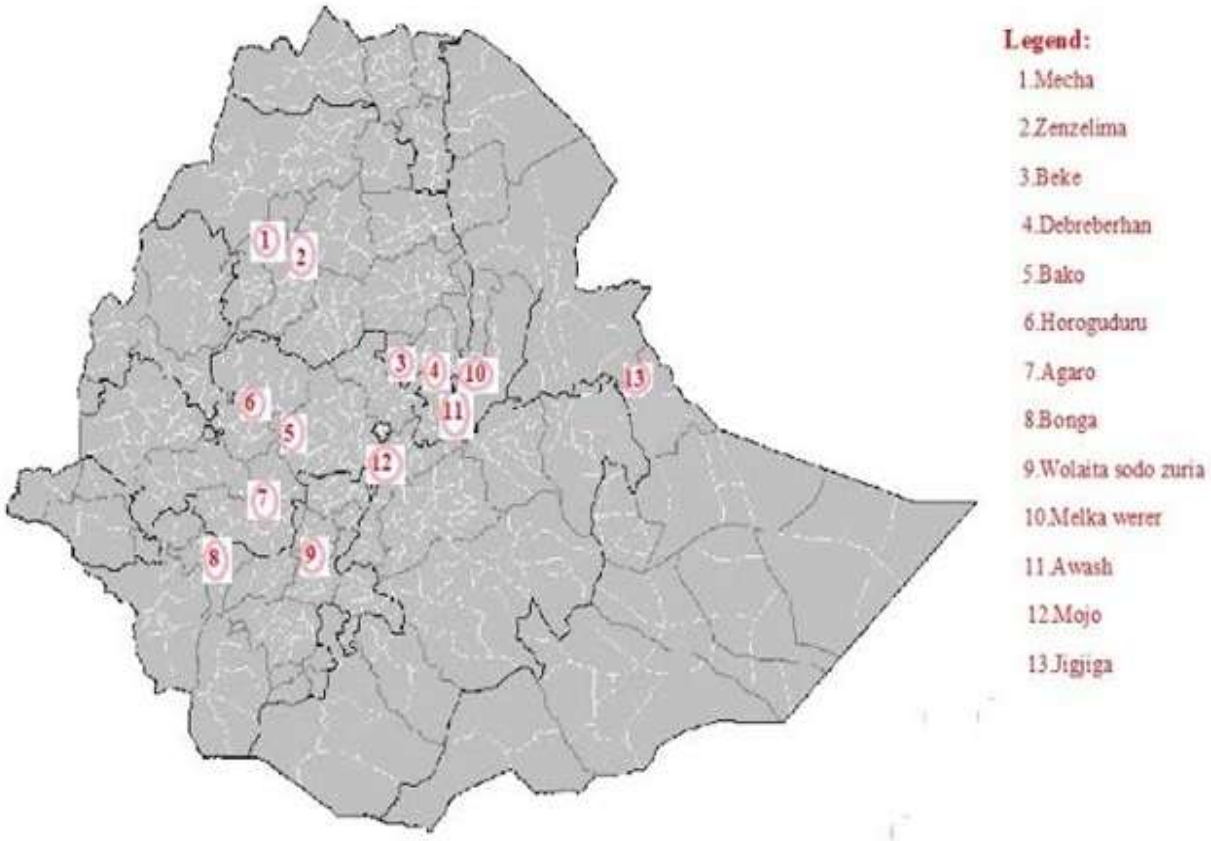

Figure 1: Areas visited to assess the sheep fattening systems in Ethiopia

Table 1: Visited areas and offices to assess the sheep fattening activities in Ethiopia

District/Bureau	Zone	Regional State	Sheep breed
Mecha district	Western Gojam	Amhara	Washera
Zenzelima district	Western Gojam	Amhara	Farta
Mecha district Bureau of Agriculture	Western Gojam	Amhara	Farta
Amhara Regional Agricultural Research Institute	Western Gojam	Amhara	Farta
Regional Livestock Resource Development Promotion Agency	Western Gojam	Amhara	Farta
Basona Worena districts	North Shewa	Amhara	Menz
Basona Worena district Bureau of Agriculture	North Shewa	Amhara	Menz
Debre Berhan Agricultural Research Center	North Shewa	Amhara	Menz
Bako Agricultural Research Center		Oromia	Horro
Zonal Livestock Resource Development Promotion Agency	Horro Gudru Wollega	Oromia	Horro
Horro District	Horro Gudru Wollega	Oromia	Horro
Zonal Livestock Resource Development Promotion Agency	Jimma	Oromia	Horro
Gomma District	Jimma	Oromia	Local
Southern Agricultural Research Institute (SARI) – Bonga Center	Keffa	SNNPRS	Bonga
Zonal Livestock Resource Development Promotion Agency	Keffa	SNNPRS	Bonga
SNNPRS* Bureau of Agriculture and Rural Development Bonga Sheep Breeding and Improvement Center	Keffa	SNNPRS	Bonga
Ginbo District	Keffa	SNNPRS	Bonga
Damot Sore District Bureau of Agriculture	Woliata	SNNPRS	Local
Damot Gale District	Woliata	SNNPRS	Woliata
Melka Werer Agricultural Research center	Zone 3	Afar	Afar
Amibara Woreda Pastoral and Agro-pastoral Buereau	Zone 3	Afar	Afar
Amibara District	Zone 3	Afar	Afar
Jigjiga District	Fafen	Somali	Blackhead Somali
Abdo Mahommed Live Animal export PLC	Awash		
Mojo Modern Export Abattoirs	Mojo		

*SNNPRS = Southern Nations Nationalities Peoples Regional State

Table 2: Climatic and demographic conditions of the surveyed areas

District/ Zone/ Region	Area (ha)		Main crops grown	Rainfall pattern	Annual rainfall (mm)	Altitudinal range (masl)	Household number		Livestock number		
	Total	Under crop					Men headed	Women headed	Cattle	Sheep	Goat
Mecha district	159899	73139	Millet, maize, teff	Unimodal (June – September)	1500 – 2000	1800 - 2500	47955	7481	276007	110710	57839
Basona Werana	120795	42825	Barley, wheat, teff, pulses	Unimodal	950-1200	2800-3200	25500	10483	136625	82221	19845
Bako	-	-	Barley, wheat	Unimodal (May - September)	-	1600	-	-	Highest	Lowest	Medium
Horo Gudru	712166	-	-	Unimodal (May - September)	-	1100 - 3170	76417	13356	1127581	199022	143386
Jimma Zone	18000 km^2	-	-	Unimodal (April – November)	2000	15% highland 68% midland 17% Savana	377000	25000	1900000	825000	202000
Keffa Zone	1102398	-	Teff, coffee, maize	Year round	800-1200	800-2800	-	-	1520083	552427	339624
Damot Sore District	-	-	Teff, maize, wheat, pea, bean, enset, taro	Bimodal (March-May & June-September	850-900	1900	18000		47668	10004	2165
Melka Werer	-	-	-	Bimodal (July-August & January - March	-	Lowland	-	-	-	-	-

Sheep fattening in Ethiopia

Importance of the sheep fattening

Sheep fattening in Ethiopia has been acknowledged as an important venture. The primary reason is the perceived profitability of the business which is acknowledged by fatteners, National Research Centers, Bureaus of Agriculture and Livestock Resource Development Promotion Agencies.

It is also perceived to have relatively low start-up costs and labour requirements. Lower investment costs in sheep fattening as compared to fattening large ruminants have also been cited. The lower risks associated with sheep fattening are gearing rural farmers as well as peri-urban and urban dwellers to get involved in sheep fattening as a sideline income generation activity. Less requirements for space and feed for fattening sheep compared to those required for large ruminants has encouraged resource poor farmers to embark on sheep fattening. This is especially the case when feed is in short supply.

Sheep fattening is not as labour-intensive activity as the fattening of large ruminants. As such, it can be undertaken using family labour as a secondary activity. This is especially true for smallholder rural farmers and peri-urban and urban small scale sheep fatteners whose labour for sheep fattening is shared with other major agricultural and household activities.

In cooperative sheep fattening systems labour does not appear to be a constraint, as members of the cooperative mainly provide the necessary labour. Conversely, in large scale sheep production and fattening farms, which are relatively labour-intensive, hired labour is used.

Sheep fattening has been noted to be a more profitable strategy than fattening large ruminants. It has faster economic returns that enable rapid expansion of the activity. The positive aspects of sheep fattening as a profitable business are attracting government policies to engage rural and urban unemployed youth into sheep fattening by organizing them in cooperatives. This was noted by the Zonal Bureaus of Agriculture and by Zonal Livestock Resource Development Promotion Agency Offices in different parts the country such as Amhara (around Bahir Dar), Oromia (around Wollega and Jimma), and South (around Woliata Sodo). There is an increasing trend of local investors registering to undertake sheep fattening businesses.

In Ethiopia, it is customary for households to slaughter small ruminants during religious holidays and the Ethiopian New Year. With the ever increasing costs of livestock, most households are unable to afford well-conditioned animals. The supply of fattened animals for domestic needs especially for the holidays and festive occasions, rather than purchasing from the market has been mentioned as one of the reasons for sheep fattening by smallholder rural farmers and peri-urban and urban fatteners.

On the other hand, sheep fattening by cooperatives or large scale sheep fatteners is primarily with the objective to produce for the market. Sheep fattening by smallholder rural and peri-urban and urban fatteners has been practiced in Ethiopia for many years. Sheep fattening by cooperatives and large scale fattening farms has emerged in recent years, since 2000. The growth in the sheep fattening sector can be attributed to the ever-increasing demand for better quality meat especially during the holidays. Moreover there is demand for well-conditioned animals from live animal exporters and export abattoirs.

Distribution of sheep fattening activities

Geographical distribution

Sheep fattening is common in almost all agro-ecologies, with a lower prevalence in the lowlands (below 500 m.a.s.l). In regions with diverse agro-ecologies, the distribution of sheep fattening activities among the agro-ecologies is influenced by regional or local perceptions. For example, in Amhara region, there is little variation in the extent of sheep fattening among the different agro-ecologies. On the other hand, in areas like Keffa zone, the highland areas are more geared towards sheep production and most of the fattening takes place in the lowland and midland areas. This is because of the perception that the fattening period is longer in highland areas due to slower body weight gain of fattening animals as a result of the relatively colder weather.

Sheep fattening is practiced as a secondary activity by smallholder farmers in mixed crop livestock farming system throughout the country and by agro-pastoralists. It is not practiced in pastoral communities. In Afar and Somali Regional States (which are lowland regions), sheep fattening only exists in the peri-urban areas and among agro-pastoralists. It is undertaken by individual producers or cooperatives. The sheep fattening activities are expanding with increasing settlements associated with the conversion of pastoralists to agro-pastoralists. According to the Amibara District Pastoral and Agro Pastoral Office, Asiata and Dupti in Afar Regional State are rapidly converting to agro-pastoralism due to the presence of forage establishments. Agro-pastoralists are producing cereals such as maize and this is encouraging the expansion of sheep fattening activities.

The predominant areas for sheep fattening in Ethiopia are regions that are home to the main sheep breeds of Ethiopia namely Washera, Farta, Menz, Horro, Bonga, Woliata (Adilo), Afar and Blackhead Somali. These are shown on Figure 1 above.

Categories of systems

Smallholder farmers are the predominant category of sheep fatteners in Ethiopia. They are located mainly in rural areas. Other categories of sheep fattening activities are found in peri-urban and urban areas, among fattening cooperatives, large scale fatteners and live animal exporters. The cooperatives draw their membership from unemployed urban youth, unemployed rural youths and farmers. Depending on the type of the cooperative, the geographical location of places where sheep fattening is practiced varies. There are both urban and rural cooperatives (Figure 2).

There may be fewer than 10 large-scale sheep fattening farms in Ethiopia (as per March 2014). This survey identified one large-scale sheep production and fattening farm located at Beke, North Shewa of central highlands. Live sheep exporters are engaged in short term (21-30 days) conditioning of sheep before exporting. A sheep exporter in Awash (Abdo Mohamed Live Animal Exporter PLC) exports more than 20,000 sheep annually. The exporter noted that there is a growing demand for fattened sheep in the Middle Eastern export market, although about 50% of the demand was said to be targeting the religious holiday "*Arafa"*.

The District Bureaus of Agriculture and Regional Livestock Resource Development Agency Offices collate data on the number of fatteners in their respective jurisdiction. According to the Amhara Regional Livestock Resource Development Promotion Agency, between September 2012 to August 2013, about 26% male and 4% female headed rural households in the Amhara Regional State were involved in fattening small ruminants, 226 cooperative youths were involved in livestock fattening activities, and about 2,401,928 sheep and goats were fattened. In Mecha district of the Amhara Regional State, 28% of male-headed households and 9% of the female-headed households were

engaged in sheep fattening. The reason for the low number of women-headed household that engage in fattening activity was attributed to lack of awareness. In some areas like Gimbo district of Keffa zone of SNNPRS, one respondent noted that almost every farming household in the district is involved in sheep fattening. About 16% of the total sheep in Jimma zone and 15% in Keffa zone (Table 2) is under fattening. Some of the Regional States are intent on promoting livestock fattening.

Figure 2: Sheep fattening youth cooperative

District Bureaus of Agriculture and Regional (Zonal) Livestock Resource Development Agency Offices are encouraging and facilitating farmers and youth cooperatives to set up both small and large ruminant fattening activities. Such offices set annual targets of animals to be fattened as well as the number of households and cooperatives expected to take part in the activities.

For instance, between September 2012 and August 2013, the Amhara Regional Livestock Resource Development Agency set a target of 5,314,355 sheep and goats to be fattened. Targets to have 1,102,556 male-headed, 367,118 female-headed households and 50 cooperative youth to participate in livestock fattening activities were set. The Agency was successful in accomplishing 45% of the planned fattened sheep and goat numbers, and in encouraging 85% of the male-headed and 33% of the female-headed households and 45% of youth cooperatives to participate in livestock fattening activities. This increased involvement in the promotion of livestock fattening activities by these offices played a role in increasing awareness and participation about livestock fattening in general and sheep fattening in particular.

Breed types

The choice of breed types for fattening is mainly based on availability of the breed in the particular area. This is especially true for smallholder farmers, small-scale urban, peri-urban and cooperative sheep fatteners. Many of them noted that they do not have any knowhow about other breeds of sheep.

Currently, there is no breed preferred countrywide for its superior value in production, quality traits or fattening potential. The sheep breeds considered in this survey are the Washera, Farta, Menz, Horro, Bonga, Waliata (Adilo), Afar, Blackhead Somali, some undifferentiated sheep types and crosses of sheep with Dorper.

Some local breeds have been mentioned as having great potential in terms of growth rate, prolificacy and meat quality. Washera, Horro, Bonga, Woliata, Afar (Figure 3) and Blackhead Ogaden breeds have good growth rates (Table 3). The Bonga breed has recently been acknowledged for its high growth and fattening potential. It easily attains a body weight up to 35-45 kg after 3-4 months of fattening. The Washera breed is a tall breed, has a huge tail, attractive colour and long bone length which were mentioned as good attributes for the breed. Horro sheep has good height, body conformation and a good skin quality. The weight of Horro can go up to 70 kg. Farmers noted that there is another breed found in Horro Gudru which they call Jimma breed. It is said to have better tasting meat and growth performance compared to Horro. Menz and Farta breeds (Figure 4) have small body frames and low body conditions. The Blackhead Ogaden sheep from Borana area is preferred by the export market more than the same breed from Esa area. The Afar breed is highly preferred in the Middle East market. The Highland sheep from Dessie and Kombolcha fetch high prices in the Middle East and are highly preferred for festive occasions.

Some fatteners believe that there is no need to crossbreed the Horro and Bonga sheep breeds with other indigenous or exotic breeds. In the Horro and Bonga sheep breed fattening areas, producers are happy with the existing breeds and prefer not to bring other breeds into their production systems. Other reasons for not wanting to crossbreed or replace localized breeds is their adaptability to feed shortage and resistance to diseases, as is the case of Menz and Farta breeds. This is despite their low growth rate and productivity.

The Farta breed has a smaller body frame and lower growth rate compared to Washera. However, the Farta breed performs better under feed scarcity compared to Washera. Crossbreeds of Washera and Farta have shown better performance than the pure Farta breed in predominately Farta producing areas in Amhara. Despite such observations, strategic selection and crossbreeding of local sheep breeds to improve low performing breeds like the Farta has not been done on a large scale.

However, there is some realization of the value of upgrading or replacing breeds for improved performance. Some farmers in Mecha District who fatten the Washera breed (Figure 3) mentioned that they are willing to fatten other breed types if the breeds are better performing than Washera. A researcher from the regional ARARI office noted that the Washera breed is good for fattening as it is high framed and fast growing. In Menz sheep producing areas, there are smallholder rural fatteners who are fattening other sheep types such as Awassi and Washera crosses.

Table 3: Growth performance and twinning of some common sheep breeds of Ethiopia

Breed	Weights (kg)					Twinning
	Birth	3 months	6 months	9 months	Fattenedsheep	
Washera	2.8	13.8	22.7	-	-	Common
Menz	2.3	11	-	-	-	Common (60%)
Horro	3.5	12-15	18-22	26-27	50	Common
Bonga	2.5-5	15-25	18-30	25-35	50-65	Common (65%)
Adilo	-	-	-	-	60	Common
Afar	2.9	10	19	-	50	Not common
Blackhead Ogaden	2.9	-	-	24	70	Not common

Figure 3: Washera sheep under fattening in peri-urban households (Mecha district, Western Gojam)

a

b

Figure 4: Farta sheep (a, Zenzelima district, Western Gojam) and Menz sheep (b, Debre Berhan, North Shewa) under fattening

The fatteners fatten the sheep breeds that are traditional to their respective areas and have not experimented with breeds from beyond their locality. As such it is difficult for them to compare the meat quality of the different sheep breeds.

Washera, Menz, Horro, Bonga, and Adilo sheep breeds were all mentioned as having good tasting and marbled meat. However, Washera sheep fatteners in the Amhara Region acknowledge that Horro breed has better meat flavour compared to Washera breed and Farta has lower meat flavour as compared to Washera sheep. The fatteners are unaware of the exact reasons for the differences in meat quality although they suggest it may be associated with kind of feed consumed.

For instance, the good taste of the meat of Menz, Bonga and Woliata sheep is believed to be associated with the consumption of tossign (*Thymus serrulatus*), and in the case of Bonga and Woliata sheep, other different green leaves prevailing in the area. Improvement in sensory quality of meat with tossign supplementation has been reported before (Tewodros *et al*., 2013). Researchers

at Debre Berhan Agricultural Research Center and Bonga Southern Agricultural Research Institute (SARI), however, believe that genotype plays a role in meat quality and suggested research work in this field. In a commercial farm at Beke, North Shewa, crossbreeds of Dorper with local sheep was mentioned to have a very good meat quality in terms of marbling, taste, softness and tenderness. Conversely, sheep breeds like the Afar and Blackhead Ogaden sheep were said to have a lot of soft fat in their meat that may negatively affect the meat quality.

Main features of sheep fattening activities

Level of complexity/scale of fattening

Most sheep fattening activities in the country are based on traditional husbandry practices and locally available inputs. Sheep fattening has not really been developed as a business by rural, peri-urban and urban fatteners but has instead been undertaken as a secondary activity. Smallholder rural farmers fatten an average of less than 5 sheep fattened per cycle. Peri-urban, urban, cooperative and large scale farmers have various flock sizes. There is need to systematically characterized these different systems.

Source of the fattening sheep

In most rural areas, sheep from own production or flock are used for fattening, although some smallholder farmers purchase sheep. Conversely, most sheep fatteners in urban and surrounding areas as well as those that fatten sheep in cooperative buy sheep from local market for fattening. It is not uncommon to get fatteners in urban and nearby areas that have one or two breeding ewes that partly supply male animals for fattening.

Selection for fattening

Generally the body condition of the animal is the key attribute during selection of sheep for fattening. Wide and deep body frame, height and length, as well as coat colour are attributes considered when buying sheep for fattening. Dentition is also used as a basis to determine the required age for fattening. Active animals are considered healthy. Visual inspection of the mouth, skin and areas around the anus are used to guess the general health condition of sheep. Coat colour of the sheep is crucial. For instance, black coat colour is not liked by consumers in areas like the Amhara region and may decrease the profit margin.

Rams are mainly used for fattening, though culled females are also fattened. Rams are fattened because they grow faster. In many places, castration of fattening sheep is practiced with the intention of making the animals docile, make them grow faster and fatter. Demand for castrated and fattened sheep is high. Farmers also recognize that castration at an early age results in stunted growth of the animal, thus recommend castration to be done for grown animals. In Woliata, sheep for fattening are castrated at the age of 9 - 12 months. In other areas, 1.5 - 2 years of age was suggested to be a good age for castration. The appropriate age of castrating sheep for fattening appears not to be clearly defined. Alemu (2008a) highlights that to prevent unnecessary breeding, sheep need to be castrated at an age earlier than 3 weeks.

There is no standard weight and age at which the sheep begin fattening. Respondents noted that Washera, Horro, Bonga, Woliata, and Afar sheep can enter fattening at 3 to 4.5 months of age, immediately after weaning. A farmer cooperative in Horro Gudru (Figure 5), respondents in Keffa zone, Woliata Zone and peri-urban sheep fatteners in Amibara of Afar Region noted that sheep enter fattening at the age of 4-6 months. A large scale farm at Beke (Figure 6) uses sheep of 4 months of

age for fattening. Most respondents across the survey gave preference to one year old sheep for sheep fattening. However, almost all respondents stated that they did not have a target weight at which to place sheep for fattening. The Amhara Regional Livestock Resource Development Promotion Agency recommended that Washera sheep need to be more than 20 kg and about a year old when placed for fattening. They are expected to gain about 200 g/day during the three months fattening period.

Figure 5: Rural smallholder fatteners with their Horro rams that were used for community based breed improvement program and now castrated and are under fattening (Horo Guduru, Wollega)

Figure 6: Breeding ewes of different breeds (left) and Dorper rams (right) in a large scale farm at Beke

Fattening cycle

For most rural and peri-urban and urban sheep fatteners, the fattening activities are seasonal. This is mainly associated with market demand seasons for fattened sheep and to a smaller extent due to feed availability for fattening. Informants from regional research offices and Bureau of Agriculture or Livestock Development Agency of the Amhara region, Wollega, Keffa, and Woliata Zones noted that 2 to 3 fattening cycles to be commonly used by rural farmers. Fatteners in Basona Worena districts of North Shewa and Horro District of Horro Gudru zones practice mainly two fattening cycles annually and an additional third cycle if possible.

Most sheep fatteners in peri-urban and urban areas of Amhara, Oromia and Southern regions encountered in this survey fatten sheep in two cycles. However, a peri-urban sheep fattener in Mecha district of West Gojam and a few others in Amibara district of Afar region said that they practice sheep fattening in three cycles annually.

The dominantly 2 fattening cycles practiced by majority of rural, peri-urban and urban fatteners in the country target two peak demand seasons for fattened sheep that are highly profitable. The peak demand is during the Ethiopian Easter (April) and New Year (September).

The third fattening cycle practiced by some producers considers Ethiopian Christmas (January). It has been noted by many fatteners that demand for fattened sheep is highest in Easter followed by New Year and then by Christmas. In Muslim dominated areas like Afar, ED Al Adeha (*Arefa*), a religious ceremony, is the high peak demand time for fattened sheep for the live animal exporters.

Youth cooperatives in Bahir Dar and around Woliata Sodo and a large scale farm at Beke practice sheep fattening in 3 to 4 cycles per year. This is because sheep fattening is a livelihood or a business for such fatteners. In the lowlands of Jigjiga, fatteners said there is enough market year round and they can fatten sheep at least four times per year if it was not for shortage of feed. Most producers indicated that they can and are interested to fatten sheep year round.

The length of sheep fattening varies depending primarily on the availability of sufficient and quality feed for fattening. Most respondents noted that 3 months fattening period is sufficient for sheep. A researcher at Debre Berhan Research Center mentioned that three to four months are require to fatten sheep, four months for colder high lying areas. A peri-urban sheep fattener in Mecha district of Western Gojam uses a four months fattening cycle, the first month being to check the health status and bring the sheep to a body condition ready for fattening in the other three months.

Another sheep fattener in the same district mentioned a four to five months as required to fatten sheep, while the Bureau of Agriculture Office of the district noted that two to three months are enough to fatten sheep. Thus, the fattening period for sheep has been reported to be as low as 2 months depending on the intensity of supplemental feeding. It is also not uncommon to keep sheep under fattening but not on continuous supplementation, which results in a longer period of stay of the animals in the finishing period.

Generally the length of the fattening period is dictated by feed availability and partly on market. Considering a minimum fattening length of 2 months, a maximum of 4-5 annual fattening cycles can be achieved. If conditioned animals are placed in a fattening regime, the fattening period is lowered.

The sheep numbers per fattening cycle are generally less in smallholder rural sheep fattening farmers and peri-urban and urban fatteners. It is intermediate in cooperatives and highest in large scale fattening farms. This is associated with the availability of production inputs such as housing and labour and differences in the objectives of production, i.e., some production systems undertake sheep fattening as specialized business while others carry out sheep fattening as a secondary activity.

There appears to be no regional variation in the number of sheep fattened by fatteners of similar category. Most smallholder rural farmers and peri-urban and urban fatteners in most places visited in this survey fatten very few (1 to 6) sheep in a production cycle. However, there are rural farmers, for instance in Basona Worena district of North Shewa, that fatten about 12 sheep per cycle, and peri-urban fatteners in Mecha district of West Gojam that fatten more than 25-60 sheep in a

fattening cycle. These are farmers who recognize sheep fattening as an activity with good economic returns.

Peri-urban fatteners in Gomma district of Jimma zone and Amibara district of Afar region fatten between 10 and 30 sheep per cycle. Youth cooperatives in Bahir Dar fattens fatten 30 sheep, in Woliata 15 sheep and farmer cooperatives in Horro district fatten 45-70 sheep in a fattening cycle. A large scale farm at Beke fattens 100 sheep per cycle and has a potential to fatten 500 sheep in a cycle.

The other factor that determines fattening cycle is feed availability. The seasonality of feeds, especially roughages and the associated rise in feed costs limit fattening in the critical periods of feed supply. Most peri-urban and urban fatteners in the Amhara region noted that roughage feed availability is low during the summer time partly due to decline in the availability of crop residues and hay and partly because farmers are busy with agricultural activities and do not bring such feeds to market. Thus, some fatteners noted that it is generally a problem to fatten sheep during such times of the year.

To overcome the seasonality in feed supply for fattening sheep, the strategy mentioned by fatteners was to buy sufficient feed and store during periods of plenty when the price is relatively low. But the problem with this is the lack of cash and shortage of space for feed storage. Thus, feed availability and associated costs limit the number of fattening cycles.

Breeding

Sheep breeding in the country is entirely through uncontrolled natural mating. This is due to a lack of genetic improvement because of lack of selective breeding. Sheep lamb down twice annually, although some producers noted that 14-16 months is required for sheep breeds like Washera and Farta to provide two lambs. On the other hand, breeds like Horro, Bonga and Adilo are said to be prolific and twinning is common. Triplets for Woliata sheep was encountered during this survey (Figure 7).

Productive animals are sold or used for fattening before leaving their genetic merit. For the Washera breed for example, there is a concern that productive males are being sold at the age of three months for fattening. The sale of uncastrated high yielding male animals to markets abroad was mentioned by the Amhara Regional Livestock Resource Development Promotion Agency office as constituting a threat to genetic erosion and uncontrolled loss of genetic resources. A researcher from the regional Amhara Region Agriculture Research Institute (ARARI) office highlighted the urgent need to try to work with domestic breeds to genetically preserve the animals and use them for future breed improvement programs so as to improve their fattening performance.

There are community-based breeding schemes for certain breeds such as Horro and Bonga (Figure 8) that select breeding males from farmers to serve as breeding rams for the community for about two year. They are then castrated and fattened for sale. Similarly, the Amhara Livestock Resource Development Promotion Agency highlighted that male animals that are used for breeding are placed for fattening after two years of age. Differences in the age of sheep when placed under fattening might influence product quality and market desirability. Younger animals at finishing may have tender carcasses and greater market demand than fattened older animals. This needs to be determined through studies on consumer and market preferences in the Ethiopian context.

Figure 7: Triplet and twin lambs for Woliata breed (Woliata Sodo surrounding rural districts)

Figure 8: a) Horro rams (Bako Research Center), b) Bonga rams (Bonga Sheep Breeding and Improvement Center), c) Woliata sheep, rural cooperatives around Woliata area), d) Afar rams (Melka Werer Research Center)

Housing

Housing for fattening sheep varies from fattener to fattener. In rural areas, most of the smallholder farmers in Amhara, Oromia and Southern regions partition part of the family house for the sheep. In Keffa zone, sheep houses are attached to the side of the main house. Farmers in Basona Worena district of North Shewa zone have separate house for sheep being fattened. Most of the peri-urban and urban sheep fatteners use a separate house for fattening sheep. Peri-urban sheep fatteners in Amibara district have fenced compounds and sheep are left in the open inside the compound. Cooperative fatteners use separate housing for sheep. Relatively better housing for fattening sheep was observed in cooperative sheep fatteners as compared to the rural smallholder, peri-urban and urban ones fatteners (Figure 9). This is because cooperatives are financially supported by a credit system or non-governmental organizations for sheep house construction.

Housing is not considered as a concern by sheep fatteners. Most housing is unclean, poorly-ventilated, lacks proper floor bedding and stocking rates are sometimes too high. This is due to lack of awareness and lack of understanding on the space requirement of fattening sheep by most producers.

Calculations made on some of the homes visited by the survey showed that the space allotted for housing was 1.3-1.6 m^2 for each sheep. According to Pasha (2006) the floor space requirement for covered area is 1.12 m^2 and for open paddock is 2.32 m^2 per animal. This suggests the presence of enough space for the sheep under fattening in the visited areas. This is due to the involvement of few animals for fattening rather than due to the knowledge of the space requirements for fattening sheep. According to an informant from Bonga Sheep Breeding and Improvement Center, the Bonga breed is sensitive to high stocking rates and requires adequate care in housing.

Labour

Fattening activities in rural, peri-urban and urban areas, share labour with other farming activities. Family labour is the main source of labour for sheep fattening. The use of hired labour by such fatteners is minimal and respondents noted that it is hard to use hired labour because of the lack of trust. Division of labour in the family for sheep fattening activities depends on who is free and available. In most cases women and children provide most of the labour needed for sheep fattening.

Figure 9: Housing for fattening sheep in youth cooperatives in rural areas (a, Wolia Sodo surrounding Woreda); and farmer cooperatives (b and c, Horro Guduru)

Fodder collection, feeding, watering, cleaning and taking care of sick animals is primarily the responsibility of women, while purchasing and selling animals is the responsibility of men. Children are involved in almost all activities as available and needed. In peri-urban and urban areas where the husband is usually involved in a government job or other self-employed activity, the woman takes on more responsibility to fatten the sheep. However, division of labour for sheep fattening is regionally different. In Basona Worena district, feed collection and taking care of sick animals is carried out primarily by men. In peri-urban areas of Mecha district, all activities including purchasing and selling of sheep are done by women. In parts of Gomma district, sheep fattening activities are carried out by children.

The cooperative sheep fatteners depend on members of the cooperative to provide labour for sheep fattening activities. Conversely, labour is a critical constraint in large scale sheep production and fattening systems because it is difficult to get hired labour willing to work in farm operations. Hired labourers tend to leave the job anytime without notice.

Feed resources and feeding management

The major sources of feed for fattening sheep are roughage, agro-industrial by-products, milling by-products, local brewery by-products, household food leftovers and screenings from cereals (tables 4 and 5).

Figure 10: Maize screened as poor quality for human consumption and to be used for sheep fattening.

The common roughages used for fattening sheep are natural pastures, crop residues, green forage chops and hay. The level and utilization of these roughages vary depending on the localities, crops grown in the area and availability. Smallholder rural farmers mainly rely on grazing natural pasture. Sheep are also provided with crop residues from their own crop production, hay, and green chops. Hay and crop residues are mainly purchased directly from farmers. In Keffa Zone and Woliata Sodo and the surrounding areas, sweet potato, sweet potato vines, sugar cane tops, false banana stem, by-products from banana, coffee a*tela*, and *atela* from boiled coffee leaves (locally called *aytetuke*) are commonly used by farmers as supplements for fattening sheep.

Fatteners use a wide variety of supplemental feeds available in their localities. These include by-products of local brewery (*atela* from *tela* or *areki*), household leftovers, milling by-products from the preparation of different pulses and cereals for human food which may contain some screenings that enhance feeding value. Different cereals (cracked maize, cooked wheat, teff, bean, grass pea, barley) are also used (figure 10).

The type of concentrates used for sheep fattening vary depending on availability, accessibility and cost of the ingredients. Access to oilseed cakes and cereal bran vary from place to place depending on the availability of food processing factories. Generally, this survey observed that access to oil seed cakes and brans of cereals for fatteners is limited in areas like Bahir Dar Zuria rural areas and is

non-existent in some districts like Horro, Agaro and Gimbo. However, farmers are willing to pay for supplemental feeds if they are available in the market. In Amhara region, farmers travel as far as 40 km to major towns like Bahir Dar to buy supplemental feeds such as noug seed cake, wheat bran and rice bran. Traders also procure by-products from bigger towns and resell them to farmers in the smaller towns. Harvested crops of relatively poor quality for the market or home consumption are fed to fattening sheep. In Amhara and Oromia, it is common for smallholder farmers to boil cereals such as teff, barley, oats and pulses for use as supplements for fattening sheep.

Depending on the crop production system, other available feeds such as by-products from enset (false banana), banana, sugar cane, coffee, sweet potato, leaves of various leguminous trees, forage legumes and pumpkins are used as supplements.

Sheep fatteners in peri-urban and urban areas mainly fatten sheep under confinement and the feeds used are generally purchased. Their own-source feeds include household leftovers, screening of cereals or pulses and by-products of homemade local brewing. The roughages used by such fatteners vary. In most areas of Western Gojam like Mecha district and Zenzelima district, grass hay and millet straw are commonly used as roughage sources for fattening sheep. In most other places grass hay is predominantly used as a roughage source. Grazing land in such areas is barely available and animals are released for a few hours of the day to move around and graze on road sides. Producers regard this as “making the sheep exercise”. Peri-urban fatteners in Amibara district lamented that there is no grazing land in the area as most of the surrounding land is under cotton production. They are allowed to graze their sheep on the stubble after the cotton is harvested.

The use of mineralized salt block licks containing various minerals required by sheep is not a common practice by farmers. This was only encountered at a large scale sheep fattening farm in Beke. However, all sheep fatteners offer common salt (NaCl) as a mineral supplement to fattening sheep. In some cases, “*bole*” a salt from the Rift Valley Lakes is used.

The various sheep fattening cooperatives differ in their feeding systems. This is due to differences in the level of understanding regarding feeding of fattening sheep. Some graze sheep during the day and offer supplemental feeds in the evening. The supplemental feeds include a mixture of noug seed cake, milling by-products (bran with smaller screening from grass pea, lentil, bean, chickpea, and pea), and *areki atela* locally called “*brint*”. Others fatten entirely under confinement. Hay and green forages are basal diets supplemented with noug seed cake, wheat bran, *areki Atela*, and *atela* from boiled coffee leaves.

Sheep exporters, particularly in Awash, condition sheep destined for export for a period of 21-30 days by feeding hay as the basal diet supplemented with a concentrate mixture of cotton seed cake, wheat bran, rice bran, horse bean bran and lentil bran. Some fatteners give fattening sheep free access to the supplemental concentrate mixture. Some feed the concentrate mixture *ad libitum* after feeding hay, while some others allowed unlimited access to concentrate mixture but only for a limited time. Some do not offer supplemental concentrate for the whole fattening period, instead giving most of the supplementation towards the end of the finishing period.

Generally, three types of concentrate supplementation are practiced. In the first type, the amount of concentrate offered to fattening sheep during the fattening period increases as the period of fattening advances. This has been noted by peri-urban sheep fatteners in Western Gojam zone and by the large scale farm owner at Beke. In the second type, concentrate is fed throughout the fattening period with no change in the amount, which has been reported by some peri-urban fatteners in Western Gojam zone, by the town youth cooperative in Bahir Dar and a researcher from ARARI. In the third type, the concentrate mixture is not fed throughout the fattening period, but fed

depending on availability. This is a common practice among farmer sheep fatteners in different areas such as in Horro Gudru Wollega and in Amhara region.

Processing of feeds is limited. Hay is treated with salt solution to improve palatability and intake. The producers believe that this treatment avoids spoilage and minimizes odour from moulding feeds in moist conditions. Chopping of hay is undertaken to enhance intake. There is limited practice of urea treatment. Essential microbes (EM) are minimally used. They are mixed with the concentrate portion of the diet to enhance animal performance. One liter of EM is mixed with 20 litres of water, a litre of molasses and 50 kg of wheat bran and stored in air tight cans. A handful of this mixture is mixed with 10 kg of mixed concentrates and fed to sheep in the morning at a rate of 200 g/day.

No sheep fattener practicing total mixed ration (TMR) feeding system was encountered in this survey. Fatteners encountered feed roughages and concentrates separately. The feeding troughs for concentrate feeding are made of old tires, wood or barrels (figure 11).

Water for sheep fattening was not mentioned as a major concern in most areas. In most areas or households visited, well water was mentioned as the main source of water. In areas where tap water is available, it serves as a source of water for fattening sheep. Streams, ponds and rivers are other sources of water.

Table 4: Price ranges (March, 2014) of the different feeds used for sheep fattening

	Price (ETH Birr/kg unless specified)	
Feedstuff	Minimum	Maximum
Millet straw	3.50	4.00
Hay	2.65	4.00
Rice bran	1.50	-
Wheat bran	1.50	3.50
Maize	5.00	7.50
Molasses (Birr/litre)	9.00	-
Noug seed cake	3.50	12.00
Lentil screenings	5.00	-
Pea bran	1.35	-
Bran from grass pea grain	4.00	-
Pulse bran	3.50	-
Areki atela (Birr/litre)	0.31	0.75
Food mill by-products	4.00	-

Table 5: Feed resources encountered for sheep fattening in different surveyed areas

Areas around Bahir Dar	Around Debre Berhan	Commercial farm at Beke	Bako	Horo Gudru	Jimma zone	Keffa Zone	Woliata Zone	Amibara	Fafen Zone
Grazing	Grazing	Hay	Grazing	Grazing	Grazing	Grazing	Grazing	Hay	Grazing
Crop residue	Crop residue	Wheat bran	Crop residue	Hay	Hay	Hay	Green chop grass, hay	Wheat bran	Maize stover
Hay	Hay	Mollases	Wheat, barley	Cooked pumpkin	Maize	Remnants from milling of food items	Wheat bran	Noug cake	Different forages
Wheat bran	Wheat bran	Noug cake	Maize	Cooked bean, wheat, barley	Wheat bran		Sweet potato vine	Seeds and leaves of forage trees	Urea molasses block
Rice bran	Bran from pulses	Pea bran	Noug cake	Noug cake	Barley bran	Crop residue	Sugar cane tops		
Cracked maize	Cooked teff, barley, beans, oats, other cereals	Grass pea bran	Tela atela	Bean bran	Cereal screenings	Bran from wheat, barley	Sweet potato	salt	Wheat bran
Noug seed cake		Lentile bran	Salt	Pea bran	Noug cake	By-products from banana and false banana	False banana stem		Oil seed cake
Grass pea bran	Cracked maize	Essential microbes (EM)		Sesbania sesban	Bean bran		Noug cake		salt
Lentile bran	Screenings from cereals	Bought mixed processed supplements		Areki atela	Pea bran	Cracked maize or maize screenings	Remnants from milling of food items		
Bean bran	Areki atela			Salt	Remnants from milling of food items				
Chick pea bran	Household food leftover	Mineral lick				Food left over	Coffee atela		
Pea bran	Salt				Areki atela	Coffee Atela	Atela from boiled coffee leaves		
Brewery by-product					salt	Areki and Tela atela			
Sesbania sesban						Salt	Areki and Tela atela		
Remnants from milling of food items									
Areki atela							Bole salt		
Household food leftover							Food left over		
Salt									

Figure 11: Different types of feeding troughs used for concentrate feeding of fattening sheep

Marketing

Most respondents noted that markets for fattened sheep are available, signaling existing demand for fattened sheep. In almost all areas visited, demand for fattened sheep was mentioned to be at the peak during religious and holiday seasons, i.e Easter, Ethiopian New Year, and Christmas in order of importance and *Arefa* for Muslims. Respondents noted that fattened sheep fetch a better price during such peak seasons. In areas like Jigjiga district of the Somali region, sheep fatteners noted that the supply of fattened sheep is limited and there is year round demand for fattened sheep for export. Moreover, with increasing demand for live sheep exports as mentioned by the live animal exporter in Awash, and with rising number of export abattoirs in the country that require more conditioned sheep for slaughter as noted by a modern abattoir in Mojo, demand for fattened sheep is expected to rise.

Nevertheless, most of the sheep fattened end up in local markets, with end consumers, hotels, traders, and middlemen buying the fattened sheep. Most sheep fatteners do not have much choice as to where to sell their animals, although travelling some distances to markets of bigger towns is sometimes used as an option to fetch better prices. There are also some traders who come to the farm-gate to buy the fattened sheep. Sheep fatteners in Amibara district go up to Awash and Metahra (about 50 km) in search of better market prices for fattened sheep. The Amibara District Pastoral and Agropastoral Office of the Afar region noted that market access is a big challenge in the area for livestock production and marketing. Fattened sheep are sold based on subjective judgments by traders and middlemen, mainly on the basis of body condition and body mass of the animals. The traders and middlemen have overall control in determining the price of sheep.

Prices of lambs purchased for fattening in the different areas ranges from 550 to 1500 Birr/sheep. In Keffa, Woliata zones and Amibara district, fatteners buy weaned sheep at 600 Birr and produce fattened animals that sell for Birr 1500. In Horro Gudru Wollega zones, weaned sheep of four months are purchased at Birr 800 and are fattened to sell at Birr 2500. Profits from sheep fattening in the current survey ranges from claim of no profit to 1000 Birr per fattened sheep, and was on average 446 Birr per animal (table 6) which is much higher than the Birr 152 Birr per fattened sheep profit noted by Alemu (2008a). Some values reported as profit seems high and may be associated with the lack of consideration of some inputs of production. Farmers fail to consider the grazing area in the calculation of profitability, although grazing based fattening was suggested to be more profitable as compared to confined fattening regimes (Shapiro *et al*., 1993).

Table 6: Mean and range of profits from the different sheep fattening production systems

Profit (Birr per fattened sheep)	Rural fatteners	Peri-urban and urban fatteners	Cooperative fatteners	Beke commercial farm	Visited organizations/offices	Live sheep exporter
Minimum	300	300	300	Claim no profit currently, probably in the future	150	50
Maximum	1000	600	900		600	-
Mean	509	483	586		433	-
Overall average profit					446 Birr/fattened sheep	

Most small-scale rural fatteners, peri-urban and urban fatteners and cooperatives appear not to give consideration to labour in the calculation of profit. Conversely, Abdi Mohammed Live Animal Exporter at Awash which is involved in a short-term conditioning (for about one month) and exporting sheep claimed a low profit of Birr 50 per animal. On the other hand, the owner of a large-scale sheep production and fattening farm at Beke claimed that sheep fattening is not profitable especially at the beginning, but believes it would become a profitable venture with time when major bottlenecks are tackled properly.

It was difficult to get appropriate information from the different categories of sheep fatteners to do the economic analysis. This is because most sheep fatteners do not have data regarding the different inputs used to fatten their animals. It is also difficult to assign prices for feed delivered from the grazing land. The amount of money spent on feeds that are purchased and fed is not recorded by many fatteners. Money spent on medication, labour, watering and housing are not recorded as well.

On the other hand, fatteners that have ideas or records of the different inputs and know the overall profit, are reluctant to truthfully tell their whole farm budget. Therefore, in the current survey only the estimated profit by the fatteners was requested and recorded. Three sampled farms each from rural, urban and cooperative sheep fattening systems were requested to provide information. This is shown in table 7. Such information however, needs to be translated cautiously. For instance, the cooperative considered only the concentrate feed bought and does not take into account feed from the grazing area and from the available forage legumes.

Table 7: Typical whole farm Budget (Birr per sheep, March 2014) of three sampled farms from rural, urban and cooperative sheep fattening systems

Parameters	Rural fattener	Urban fattener	Cooperative fattener
Cost of sheep purchase for fattening	920	1400	700
Feed cost	200	450	34
Cost of veterinary drugs	30	50	10
Labour cost	50	50	50
Transportation cost	10	-	-
Sale of fattened sheep	1600	2500	1650
Profit	390	550	856

The profit from sheep fattening is used for various purposes. Most claim to use the profit to expand the sheep fattening business. The profit is also used to cover costs of fertilizer, improved seed, household expenditure, school expenditure and clothing among rural and peri-urban and urban fatteners. Some also claim to use the sale and profit of fattened sheep to buy dairy crossbred heifers to build more valuable assets. All respondents were in agreement that sheep fattening is a growing profitable business in Ethiopia which may supplement other incomes – from farms in rural areas or from paid jobs in peri-urban and urban areas.

The number of producers involved in sheep fattening and associated businesses has increased over the last five years. However, there has not been much change in institutional support for sheep fattening activities. Although there are credit institutions (table 8) for small-scale sheep fattening, there is limited access for most fatteners. Only farmers who are members of cooperatives can access the credit. The high interest rate of the credit which is about 18% also discourages many producers from applying for it.

An insurance system for the sheep fattening business is entirely non-existent. Fatteners believe there is a need to have an insurance system for sheep fattening to safeguard them from unforeseen risks in the business. Similarly, market linkages have not been created for producers to better benefit from the sheep fattening activities. This has led to most benefits from sheep fattening going to brokers or traders.

Table 8: Credit institutions for fattening sheep in some of the visited areas

District/Bureau	Zone	Regional State	Sheep breed
Amhara Credit and Savings	Western Gojam	Amhara	Washera
Oromia Credit and Savings	Horo Gudru Wellega	Oromia	Horro
Education for Development Association	Horo Gudru Wellega	Oromia	Horro
Bonga Microfinance	Keffa	SNNPRS	Bonga
Family Asset Building through Family Package	Woliata	SNNPRS	Local
Rural Job Creation Project	Woliata	SNNPRS	Woliata

Constraints to sheep fattening

Feed constraints

Among most sheep fatteners, feed ranked first as a constraint. The seasonal availability of feeds, especially roughages, was mentioned as a major bottleneck. March to August were mentioned as times of feed shortage, and September to February as better periods in Washera and Horro sheep producing areas. In such areas, available grazing land becomes low during the summer. During the rainy seasons, management of fattening sheep becomes difficult in the highlands because of the mud that reduces the intensity of sheep fattening.

In systems where hay and crop residues are bought and utilized, availability is low during summer partly because farmers are engaged in agricultural activities and do not supply them to urban and peri-urban areas. By-products such as *areki atella* used for sheep fattening may be in short supply during the same period because there is insufficient firewood and sunshine necessary to dry and prepare ingredients used for the manufacturing of areki.

Feed prices also fluctuate. Sheep fatteners in the Amhara region mentioned that the major constraint regarding feed is the high price rather than feed availability, as they believe enough feed is available but becomes expensive during certain periods of the year. Thus, purchasing feed in advance and conserving it was mentioned to be the strategy that needs to be followed. The price of most agro-industrial concentrates does not fluctuate much by season as compared to the price of roughage feeds.

The seasonality of feed supply impacts on systems where there are no grazing areas and all roughage feeds are purchased. As a result, fattening cycles are limited. The supply of roughage feeds to peri-urban and urban producers is steadily dwindling because of the shortage of grazing land in rural areas. This is due to the conversion of more and more grazing land to crop farming. The prices of roughage feeds have, thus, risen. Consequently competition for scarce feed is on the rise. One respondent said that *areki atella* used to be dumped as garbage previously, however, with its increased use as a livestock feed, it is now sold for high prices. The price has gone up to such an extent that producers have started diluting it with water to increase the volume and profit.

Feed quality is also an issue mentioned by fatteners who rely on grazing. Most of the grazing areas are poor in terms of forage biomass as well as species composition. Thus, grazing pasture does not provide sufficient energy and protein for fattening sheep. The quality of the hay used for sheep fattening was also mentioned as being of poor quality. This may be associated with the stage of maturity of the forage upon harvest for hay making and the species composition of the pasture from which the hay was made.

Several sheep fatteners mentioned the lack of packaged concentrate rations as a constraint for sheep fattening. They indicated their willingness to pay for mixed concentrate rations prepared for the purpose of sheep fattening. There are very few feed companies that process and sell mixed concentrate rations that can be used for sheep fattening in almost all parts the country. The Amhara Regional Livestock Resource Development Promotion Agency noted that the few companies that exist tend to sell mixed concentrates that lack clear specifications of the products. This appears to be an area that can attract investment, and would play a significant role in enhancing the productivity of the sheep fattening sector.

There are attempts by the regional research institutes and Bureaus of Agriculture to try to acquaint framers with different improved forage species, forage production, feed improvement and conservation techniques. Around Horro Gudru, elephant grass and Rhodes grass have been distributed. Around Agaro and Bonga, the introduction of forages species like cowpea, Rhodes grass, lablab, grass pea, oats and elephant grass has begun. Around Bonga, training in silage making and urea treatment has reached farmers and has shown good results. Distribution of seed and training in the production and utilization of desho grass, elephant grass and various leguminous forage species as well as feed conservation in form of hay and dried sweet potato tubers has been ongoing in surrounding Woliata Sodo areas. Around Jigjiga, sheep fatteners produce forages like Sudan grass, alfalfa, lablab, and *Panicum* spp. However, such efforts need to have a wider coverage and need to be complimented with allocation of land for forage production.

Market constraints

The lack of reliable and sustainable markets is a concern for sheep fatteners. Some fatteners interviewed mentioned that they can tackle feed problem by strategic purchasing of feeds in times of plenty and storing it for anticipated times of shortage, but they have no control over the market, In the Afar region, the market problem takes precedence to feed issues.

Regional livestock experts noted that market linkages should be one of the vital priority areas to make sheep fattening provide better returns to producers. Information on the sheep value chain and value addition was noted by the Amhara Regional Livestock Resource Development Promotion Agency as an aspect of intervention that should be worked on. Export oriented fattening and conditioning of sheep, processing of the conditioned or fattened animals rather than live animal export was noted to be an area that demands research, development and policy interventions.

Institutional involvement has not always been useful. The prohibition of traders and exporters from buying fattened sheep from local fatteners during festive high peak holidays with the intention of stabilizing the market price for local consumers was mentioned by peri-urban fatteners in Mecha district of Western Gojam as dampening profit margins.

Husbandry practices

The level of information on improved husbandry practices among most sheep fatteners is low. Production practices are entirely traditional. For example, most fatteners in the rural areas house

their sheep in partitioned sections within the family house. This is inappropriate for the wellbeing of the household members. Such practices may not necessarily be due to the lack of land or resources, but rather due to lack of knowhow. The fatteners believe that this housing practice works well for them. Fortunately, most are eager to accept advice and learn better ways of sheep management. This creates a good opportunity for the development of technologies, formulation of improved packages and training for practitioners. However, husbandry technology packages for sheep fattening seem non-existent. Most of the packages related to small ruminants as informed by district, zonal and regional livestock experts in the Bureau of Agriculture or Livestock Resource Development Promotion Agency offices are related to production aspects and not directly at fattening.

A manual developed for sheep fattening by researchers at ARARI recommends a mixture of noug seed cake, wheat bran and salt at a level of 500 g/day concentrate supplementation for fattening Washera sheep and 300-500 g/day for Menz/Farta sheep in addition to hay fed *ad libitum.* Similarly, in Horro region, the recommendations for fattening Horro sheep by Bako Agricultural Research Center are 450 g/day of 49.5% noug seed cake, 49.5% maize grain plus 1% salt with hay offered *ad libitum*. Since maize is not readily available in the area, wheat or barley are used to replace maize. For Bonga and Woliata fattening sheep 500 g/day concentrate supplementation is recommended. These feeding packages are developed with the intention of providing sufficient protein and energy for fattening sheep.

Labour constraints

Labour demand for sheep fattening depends on the number of sheep maintained for fattening and the objective of production. Most smallholder rural and small scale peri-urban and urban fatteners keep very few sheep for fattening in a given cycle. Labour is therefore not a big concern and the work is handled by family members. It is occasionally a constraint when children, who look after the sheep, go to school. Labour migration to big towns is also resulting in labour shortages.

In peri-urban and urban fattening systems, labour was mentioned as a constraint. A large scale producer at Beke noted that his major concern with business in livestock sector in general and sheep fattening in particular is the lack of labour force eager and energetic to work in farm activities. The owner of the farm said that covering basic needs such as meals, housing and working clothes in addition to a relatively decent monthly pay, made it near impossible to maintain workers in the sector. This is frustrating for investors in the sector. He suggests that interventions through the creation of awareness about the jobs available in the sector are necessary.

Labour is not a concern in cooperative sheep fattening system as members of the cooperative are directly involved in various activities.

Disease constraints

Health problems of fattening sheep are related to the prevalent diseases in respective areas. In almost all places visited, liver fluke (*Faciolia hepatica* and *Facila giagantica*) was mentioned as the main health problem for sheep (table 9). Other internal parasites include lung worm, ticks and pneumoniare. Anthrax was also observed in some areas. Different strains of ovine pasteurellosis also cause death to sheep. Generally disease was not mentioned as a major constraint for fattening sheep. Fatteners who depend on purchased animals for fattening noted that the health status of the animals upon purchase, especially with regard to parasitic load, is usually not known.

A researcher at Debre Berhan Agricultural Research Center noted that there is no strategic deworming of sheep against parasites, including liver fluke, at the producer level. This can be an area of intervention to decrease risks associated with parasites in fattening sheep. There is ongoing research on strategic deworming for liver fluke in Debre Berhan Agricultural Research Center, which could be extended to sheep fatteners. The absence of quarantine systems, free mixing of animals from different sources or places, as well as mixed livestock species grazing together predispose animals to various diseases.

Lack of drugs to treat liver fluke and other parasites was raised as a major concern by researchers at ARARI. Shortage of drugs and use of expired drugs are constraints related to sheep health. Inappropriate use of drugs has resulted in drug resistance strains of liver fluke. In Oromia, the efficacy of the drugs was mentioned by Zonal Livestock Resource Development Promotion Agency to be good, presumably due to the regional policy to purchase and use only tested and proven effective brands of drugs. This is contrary to the poor quality type of drugs purchased in Amhara region which is mainly associated with the federal tender rules of purchasing the least cost drugs. There is need for the authorities to provide farmers with a list of recommended drugs for treatment of the various diseases. Some vaccines, such as for ovine pasteurellosis, are said to be ineffective for some strains of the virus according to researchers in ARARI and SARI, Bonga. Indigenous practices to treat sick animals have not been covered in this survey, however, around Bonga, inhaling tobacco is used to treat coughing animals.

The lack of sufficient trained people to treat sick animals in the rural areas was noted as a serious constraint related to sheep health. One veterinarian works in shifts to cover at least three rural *kebeles*. Farmers suggested at least one veterinarian for each *kebele*. Realizing this problem, a Government policy has been introduced to have one veterinarian posted to each *kebele*. For this, a revolving fund of one million Birr has been created.

Table 9: Common diseases of fattening sheep in different areas of the country

Amhara Region (around Bahir Dar & Debre Berhan	Bako & Horo Gudru	Jimma zone	Keffa Zone	Woliata Zone	Amibara	Fafen Zone
Liver flukes (Fasciola hepatica&Fasciola gigantica	Liver flukes	Liver flukes	Liver flukes	Liver flukes	Liver flukes	Liver flukes
Intestinal worms	Intestinal worms	Endo parasites	Intestinal worms	Haemonchus contortus	Haemonchus contortus	Haemonchus contortus
Lung worm	Lung worm	Ticks	Lung worm	Coughing	Ticks	Tick and mange
Pneumonia	Pneumonia	Foot rot	Ticks, lice, mange	Eye disease	Foot rot	Pneumonia
Ticks		Peste des Petits ruminants (PPR)	Ovine pasteurellosis	Ovine pasteurellosis	Pneumonia	Antrax
Ovine pasteurellosis					Ovine pasteurellosis	Foot rot
Anthrax					Orf	Sheep pox

Risks associated with sheep fattening

The main risk associated with sheep fattening activity is the loss of animals. This could be due to disease, predators or theft. Price fluctuation is another risk associated with sheep fattening. To minimize risks associated with disease there is a need to enhance the service delivery system and ensure availability of enough health services. Strategic deworming and proper vaccination must be developed and in place. Risks associated with predators and theft can be minimized using proper housing. Selling animals at the right time when demand for fattened sheep is high is a good strategy to avoid loss of profit due to lack of demand. The lack of insurance system for sheep fattening was also mentioned as a reason for not getting an opportunity to minimize risk from the business.

Sustaining sheep fattening in Ethiopia

The rise in human population both in Ethiopia and globally, urbanization and rise in income is expected to increase the demand for livestock products, including mutton. This represents a great opportunity for Ethiopia to improve and enhance the existing livestock production system in general and sheep production and fattening in particular.

Currently, there appears to be great interest for involvement in sheep production and fattening as a result of the perceived profitability of sheep fattening. Increased involvement in sheep fattening is positively supported by the existing government policies that targets production and export of more live animals, meat or mutton and livestock products like skins, hides and leather. The Growth and Transformation Plan (GTP) strongly supports intensified production of marketable farm products for domestic and export markets, by small farm holders and private agricultural investors. The GTP has established annual export goals of 111,000 metric tons of meat and 2 million live animals by the year 2015, a four-fold increase from 2011. The GTP plans to increase feed, fodder seed production, improve the quality of local sheep breeds, the quality of skin and hides, health services and the accessibility of vaccines.

Planned water development activities together with improvement of pasture land and irrigation schemes in the pastoral area, coupled with the consequent voluntary resettlement of pastoralists are expected to enhance fattening activities in pastoral and agro-pastoral areas. Moreover, to improve the marketing infrastructure and provision of market information system are targeted at enhancing the profitability of sheep fatteners.

Improved natural resource management, developing land through irrigation and increased production of crops planned in the GTP will directly or indirectly positively impact its role through crop-livestock integration in sheep fattening. The establishment of the State Ministry for Livestock and the re-organization of the Livestock Development department into the Livestock Resource Development Promotion Agency in different regional states of the country is also an indicator of the attention the government is giving the livestock sector.

In the surveyed areas of Horro Gudru, Jimma, Woliata and Keffa zones, there is a plan to organize unemployed youths including unemployed university graduates to work on sheep fattening under the banner of micro and small scale enterprises that are targeted by the GTP to absorb the available unemployed working force. These enterprises can provide a platform to transform the sheep fattening business into a more modern production system, through the provision of proper training and organized institutional support.

Sheep fattening can be a year round business if the production and marketing constraints are addressed. Constraints along the chain of livestock production and marketing in general and sheep fattening in particular may be improved through interventions in the value chain (AGP-LMD, 2013). Such an approach will identify market-oriented actions that will generate demand, improve supply linkages, ensure adequate returns for all actors in the value chain, and promote investment. Thus, experiences of various livestock projects of the past and present such as Improving Productivity and Market Success (IPMS) of Ethiopian Farmers, Livestock and Irrigation value Chain for Smallholders (LIVES), the Agricultural Growth Program – Livestock Market Development (AGP-LMD) and the Small Ruminant Value Chain of Ethiopia (ICARDA) need to be consulted to gear the research and interventions in a manner that impart greater productivity and ensure the sustainability of the

sheep fattening business to improve the livelihood of producers. The numbers of export abattoirs are also increasing. This may provide market for fattening sheep and an opportunity for value addition.

In Ethiopia, federal and regional research institutes, higher learning institutions, international institutions, non-governmental organizations and the private sector have been involved in livestock research in general and in sheep research in particular. These research activities have generated a wealth of knowledge that can be employed to improve the productivity of sheep production and fattening.

For instance, aspects related to sheep feeding and nutrition, forage development for sheep, feed conservations techniques, sheep breeding, health and other management issues have been documented in a "Sheep and Goat Production Handbook in Ethiopia" produced by the Ethiopian Sheep and Goat Improvement Program of the USAID (Alemu, 2008a). Moreover, chemical compositions of different feedstuffs from all over the country have been characterized by the research system as well as by graduate students of the higher learning institutions. There has been a lot of work to assess various supplemental feeding regimes on growth rate, slaughter characteristics and carcass yields of different sheep breeds by MSc and PhD students. This information can be compiled to come up with a feeding strategy for sheep fattening based on the available resources in the different localities. However, research efforts undertaken so far appear to be inadequate to make significant contribution to sheep fattening given the huge landmass and abundant sheep resources of the country.

The availability of diverse sheep breeds with variable and good attributes in terms of, meat quality, skin quality and prolificacy (Solomon *et al*., 2010) enhance prospects for intensified sheep fattening. The community based breeding and conservation programs that have been introduced for some sheep breeds should be strengthened and expanded to include all the sheep breeds found in the country. This would give an opportunity to enhance productivity through selection and thus increase the productivity and profitability of the sheep fattening business.

Ethiopia has comparative advantage in terms of geographic proximity to the Middle East markets, with the potential for rapid delivery of fresh meat or meat products. Ethiopia's sheep breeds are also highly demanded in the Middle East due to their taste and the organic nature of their production. Moreover, there has been a rapidly developing food services sector that can absorb mutton.

Challenges to sheep fattening in Ethiopia

Ethiopia has diversified sheep breeds and population. However, efforts in genetic improvement of the existing sheep genotypes undertaken so far either through selection and breeding or through crossbreeding have not yielded tangible results.

For enhanced productivity and sustained profitability of the sheep fattening systems in the country genetic improvement is essential. Sheep breeds need to be developed to have a genetic potential to respond to the better feeding regimes of sheep fattening. Thus, the low productivity of the existing sheep breeds in the country is one constraint that demands attention to improve the productivity and enhance sustainability of sheep fattening activity in the country

Table 10: Differences among the four sheep fatteners captured from the survey

Differentiating factor	Smallholder rural farmers sheep fatteners	Peri-urban and urban small scale sheep fatteners	Cooperative sheep fatteners	Large scale sheep fattener
Production objective	Sideline activity	Sideline activity	Main activity	Main activity
Age of the system	Old	Old	Recent and emerging	Recent and emerging
Distribution	Throughout the rural areas	Most areas	Few but growing	Very few
Major feeding system	Grazing based mainly	Confinement	Confinement	Confinement
Supplement type	Cooked cereals and pulses commonly used	Mainly milling and agro-industrial by-products	Mainly milling and agro-industrial by-products	Mainly milling and agro-industrial by-products
Access to agro-industrial supplements	Limited or non-existent	Good	Good	Better
Labour utilization	Family labour	Family labour	Cooperative members	Hired labour
Number of fattening cycles	2-3 mainly 2	2-3 mainly 2	3-4 mainly 3	3-4 mainly 3
Number of sheep in a cycle	Mainly 1-6 (up to 12 encountered)	Mainly 1-6 (25-60 encountered)	15-65	100 (possible up to 500)
Source of sheep	Mainly from own flock	Mainly purchased	Purchased	Produced and purchased
Breed choice	Based on available breed	Based on available breed	Based on available breed	Based on own choice
Housing	Partitioned house mainly	Mainly separate housing	Separate housing	Separate and good housing facility

Conclusions

Delineating different sheep fattening systems and characterizing them requires detailed information and sufficient data on production, labour, marketing, and socio-economic issues. The brief survey work for this report was unable to capture adequate data for this purpose. However, observable differences exist among the different fatteners encountered in this work – see table 10.

Based on such variations, the existing sheep fattening/finishing activities found in the country can be broadly grouped as i) smallholder rural farmers sheep fattening system; ii) peri-urban and urban small scale sheep fattening system; iii) cooperative sheep fattening system; and iv) large-scale sheep fattening system. Moreover, live sheep exporters who are engaged in a short term (21-30 days) conditioning of sheep before exporting, have their own peculiar characteristics, although their issues appeared to be similar to those of large-scale sheep fattening farms.

Differences among fatteners noted in table 10 indicate that those with a commercial orientation tend to have more control on the overall management as well as the type/breed of sheep to use for fattening. With efficient use of resources, animal performance and associated product quality, profitability and consequently sustainability of the system would be enhanced.

The four broadly categorized sheep fattening systems need to be further characterized based on more detailed and well planned research, and actual differences need to be highlighted to guide appropriate intervention measures

Recommendations

The sheep fattening system in the country is traditional. There appears to be almost no production and management technology packages for fattening sheep in the country. The scattered bits and pieces of research activities conducted by research institutions, universities and graduate students lack practicability and don't relate to the reality on the ground. They fail to address the multifaceted constraints that the sheep fattening system is facing.

Recommendations from research that has been undertaken has not found its way to the practitioners. Moreover, development focus and policy intervention in sheep fattening is minimal in the country.

To make the sheep fattening system productive and sustainable, interventions in terms of research, policy and implementation are needed. This should begin with identifying the priority areas and identifying the actions that need to be undertaken.

The major constraints to sheep fattening that demand research, development and policy interventions are more or less similar across the different sheep fattening systems and/or agro-ecologies.

Researchable issues

The existing technical constraints to sheep fattening have not been tackled through well-planned, problem-oriented research activities. To change the existing situation, market-oriented research should be conducted into all husbandry practices and appropriate recommendations made.

From this survey, it can be generalized that variations in sheep fattening among producers mainly depends on available production inputs and the common management practices of sheep fattening in the area. Sheep fattening activities do not seem to appreciably vary among the different agro-ecologies. Nevertheless, there is need for detailed and comprehensive studies to characterize the existing sheep fattening systems in Ethiopia. This would be vital to identify specific intervention areas related to specific sheep fattening systems. Such characterization should come up with recommendations to maximize the utilization of the available production inputs for increased productivity and enhanced sustainability of the sheep fattening systems.

Issues to be tackled should include; how the available feed resources can be combined and effectively utilized as well as non-conventional feed ingredients that may enhance feed utilization.

Feeds and feeding systems is the major bottleneck that impacts on the productivity and sustainability of the sheep fattening systems. The feeding systems are based on the available feed resources in the area and are not on the requirements of the animals. Knowledge on the nutritional requirements for fattening sheep is lacking. As such there is no practice of ration formulation. Therefore, feed resource assessment and nutrient requirement of different breeds of sheep under fattening needs to be researched. Moreover, least cost ration formulation mechanisms needs to be developed to satisfy the requirements of the animals based on site specific feed resource incorporating feed ingredients external to the area to balance shortfalls in nutrient supply from the available feeds.

For sheep fattening systems that are based on confined feeding, the possibility of formulating and using total mixed ration (TMR) feeding system needs to be investigated. For pasture-based fattening

systems, grazing land improvement should be undertaken. In addition, the concentrate portion of the ration that can provide the needed supplemental nutrients for grazing based fattening sheep should be researched and formulated. The concentrate portion of the diet used for fattening sheep in the country is mainly based on agro-industrial by-products and milling by-products. However, there is a need to search for alternative feed sources that can use cassava, sugar beet, maize and the like as components of the concentrate portion of the ration.

Thus, the economics of using alternative concentrates for feeding needs to be studied. The least cost fattening options in terms of feeds and feeding needs to be developed for each specific geographical area. There is a need to set up feed manufacturing companies either through investors or cooperatives

Research endeavors should also suggest which how stratification in the sheep industry can unfold e.g through agro-ecologies, regions based on breed types etc.

Breed improvement and conservation is another area that demands research intervention in sheep production and fattening. This could either be through selection and breeding or through cross breeding. Crossbreeding can be between the existing breeds in the country or with high performance exotic breeds. Fatteners of Horro and Bonga breeds do not need crossbreeding. On the other hand, breeds like Washera and Menz, require genetic improvement for fattening. The ongoing attempts to make genetic improvement of the Horro and Bonga breeds through selecting good performing male animals from the farmers and using them for breeding purpose should be developed further.

Such breeding strategies need to be extended to other potential breeds like the Washera. It is important to conserve the breed in general and high producing animals in particular as lies the risk of productive males being fattened or sold without leaving their genetic merit. Therefore, a center should be established to maintain selected animals of each sheep breed that can serve to conserve the breeds and supply improved genetic material. This has been done for few sheep breeds like Horro at Bako Research Center, Bonga at SNNPRS Bureau of Agriculture and Rural Development Bonga Sheep Breeding and Improvement Center, and Afar at Melka Werer Research Center. There is a need to expand the undertaking to other potential breeds.

Comparative studies for the different breeds of sheep in terms of fattening performance and product quality are areas where an information gap exists. As such, the currently practiced breed choices for sheep fattening in the country merely depend on the available breed of sheep in the area rather than performance or product quality.

Different issues related to sheep fattening such as when to place sheep of different breeds for fattening (minimum age and weight of the animals), the length of the fattening period, expected weight of fattened sheep, animal housing requirement and housing types for different agro-ecologies, when to castrate sheep for fattening need to be researched and recommendations made. Training on the various management issues of sheep fattening is quite crucial to enhance the productivity and the sustainability of the system.

The prevailing market chain, market linkages and value chain of fattened sheep in the country needs to be investigated and clearly documented. The study should be designed to come up with proper recommendations on the marketing, market linkage and value chain of fattened sheep. Under the current marketing system, some respondents noted that brokers and other marketing actors benefit more than producers. There might also be some illegal sales to neighboring countries minimizing the benefit that can be obtained from the sector.

Disease related animal fatality is a major risk in sheep fattening. Although some common diseases have been mentioned by respondents, there are diseases that are difficult to be identified by producers or junior veterinarians. Thus, detailed characterization of the prevailing diseases that impact sheep fattening needs to be made. The characterization work should encompass the identification and establishing the seasonality of such diseases if indeed there is a seasonal aspect to the diseases for timely actions. On the other hand, some vaccines for diseases such as ovine pasteurellosis have not been effective. Therefore, specific strains of the virus for such kind of diseases need to be identified for different areas, and strain specific vaccines developed. Moreover, the different brands of medicines used to treat ailments need to be characterized with regard to their efficacy. More effective medicines need to be recommended for use throughout the country.

Development issues

Various developmental measures need to be considered to help enhance productivity and sustainability of the sheep fattening business. To combat the problem of feed, improved forage development was noted by many as an issue that needs to be given priority. The introduction and development of green fodder species such as *Sesbania sesban, Vetch spp.,* elephant grass and improved grazing land forage species like Rhodes grass, Desho grass and others which have been identified as suitable for different areas of the country should be undertaken. This demands the development of a forage seed supply system at an affordable price.

In relation to the concentrate feed supply for fattening sheep, there is a need to develop feed processing plants that can bring a mixed ration supply system for sheep fattening. This can involve investors or can be done through formation of cooperatives. A clear chain of marketing of agro-industrial by-products can be established through supplying the by-products directly to the feed processing plants to formulate mixed rations for sale. This would ensure favorable pricing of such by-products and reduce feed costs or costs of production. Currently, the traders of agro-industrial by-products have total control on the pricing of such feeds.

Other development issues mentioned were:

- There is a need to develop scheduled vaccination, and strategic deworming programs which are currently not in place.
- The need to establish veterinary laboratories with necessary equipment and accessories for disease identification (especially of epidemics) and timely treatment of animals can be undertaken.
- Provision of water for humans as well as for livestock.
- The integration of production and marketing channels. For instance, production and fattening activities can be done by different value chain actors that are connected to input providers (like feed manufactures) and value chain marketing actors.
- A grading system which sets out a specific criteria that is to be used to determine the quality of the fattened sheep should be established. This will guide the producer to know what to expect for their sheep based on the quality of their product.

Policy issues

People involved in livestock production in general and that of sheep fattening in particular believe that equal attention is not given by the Government to the livestock sector compared to the crop sector. Therefore, sheep fattening should be recognized as an economically important activity and due policy attention given to it to enhance its contribution to household livelihood and food security.

VAT is charged on by-products from the agro-processing industries which constitute the inputs for processing animal feeds. This increases the cost of fattening the sheep. The Government should therefore zero rate by-products resulting from agro industries. This should be coupled with a policy to discourage the export of unprocessed cereals, oilseeds and pulses so that the same is processed locally availing the by-products for use in animal feeds manufacturing. Quality standards for the ingredients used as concentrate feeds in fattening should be developed and enforced so that the quality of the feeds provided to fatteners is assured.

Conversion of grazing land to crop production is an impediment to expansion of sheep fattening activities. There is need for a policy to ensure that a certain portion of land is set aside for pasture in areas with high potential for sheep fattening.

Taxes levied on sheep for sale in local markets especially in the festive season when demand for sheep is at its pick are high, discourage sheep fatteners. There is a need to review such taxes so that they don't impede the growth of the sector.

The sector has the potential to be a foreign exchange earner. To realize this potential, export promotion incentives should be identified and implemented.

Other issues that demand policy intervention are:

- Veterinary supplies should be improved. The current government tender system that depends on the cheapest prices locks effective veterinary drugs out of market. There is also a report of illegal ineffective drugs crossing the borders. There is need to have a strong policy and controlling system on veterinary drug use.
- There should be a credit system for those involved in such business. Credit system would encourage many people to embark on the business. Civil servants can also participate in such business given initial capital.
- There must be an institution to address the problems of investors and producers in the sector. The policy in terms of importation of tax free items, ownership of investment land must be clear and workable.

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